

Impact of Telephone Triage on Medical Service Use: Implications for Rural and Remote Areas

J. C. Hogenbirk, R. W. Pong, S. K. Lemieux

ABSTRACT. *Lack of ready access to health services is a continuing problem for the one-quarter of northern Ontario residents who live in non-urban areas. Telerriage has been proposed to help reduce medically unnecessary visits and thus free-up available resources. A mail survey obtained information about patients' use of telerriage and other health care services, as well as socioeconomic and demographic characteristics. Survey data (n = 2389) were used to determine the impact of telerriage on health service use by asking about the patient's intended use of health care service (intent), the service advised by the nurse (advice), and the actual health service used by the patient (action). Responses were compared among geographic categories based on commuter flows to urban areas in northern Ontario. Survey responses suggest that telerriage may have decreased visits to emergency departments relative to patient intent, and this effect appears to be stronger in communities with weak or no commuter flows (intent = 54%, action = 41%) than in urban areas (intent = 39%, action = 33%). Visits to physicians' offices or clinics may have increased relative to patient intent, but only for non-urban areas (intent = 16%, action = 21% to 23%) with strong, moderate, weak, or no commuter flows. Very little difference was found among geographic categories for calls or visits to other health care providers (overall: intent = 17%, action = 11%) or for informal care (self-care and care for others) (overall: intent = 16%, action = 29%). Results should be interpreted carefully, as there was evidence of selection and social desirability bias.*

Keywords. *Health service use, Northern Ontario, Rural health, Telerriage, Urban health.*

Maldistribution of health care practitioners and services, with the resultant issue of timely access, is an ongoing problem for residents of northern Ontario. For instance, physician:population ratios were lower in northern Ontario than in the major metropolitan areas of Ontario, and physicians who work in areas with low physician supply tend to have heavier workloads (Chan, 1999). The problem may be more profound for those in northern Ontario who live in non-urban areas. An examination of hospitalization data in northern Ontario concluded that residents of small communities had insufficient access to primary care (Shah et al., 2003). A Canada-wide survey, conducted in 2000-2001, found that residents of northern Canada had the highest percentage of individuals with self-reported un-met health care needs (Mitura and Bollman, 2003). Telerriage has been proposed as one method to help reduce medically unnecessary visits and thus free-up available resources, as well as to help reduce patient travel and associated costs.

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The authors are **John C. Hogenbirk**, MSc, Senior Researcher, **Raymond W. Pong**, PhD, Research Director, and **Sandra K. Lemieux**, BA, Research Assistant, Centre for Rural and Northern Health Research, Laurentian University, Sudbury, Ontario, Canada. **Corresponding author:** John C. Hogenbirk, Centre for Rural and Northern Health Research, Laurentian University, 935 Ramsey Lake Road, Sudbury, Ontario, Canada P3E 2C6; phone: 705-675-1151 ext. 3435; fax: 705-675-4855; e-mail: jhogenbirk@laurentian.ca.

A recent systematic review of teletriage services concluded that teletriage decreased immediate practitioner visits without increasing adverse effects (Stacy et al., 2003). For example, in one of the cited studies, O'Connell et al. (2001) used a pre-post study design to assess the impact of a nurse-led teletriage service on visits to physicians' offices by plan members of a HMO in Kansas City, Missouri. O'Connell and colleagues found a statistically significant 4% to 5% decrease in the use of outpatient physician services during one year of a teletriage service compared to the previous year without the service.

The effect on immediate emergency department visits was less clear (Stacey et al., 2003). In another cited study, Darnell and colleagues (1985) did not detect any statistically significant differences in emergency department (ED) visits or in hospitalizations between their control group and either of their two teletriage groups in their randomized controlled trial (RCT) of a physician-led teletriage service. In comparison, O'Connell et al. (2001) found a statistically significant 3% to 4% decrease in hospital ED utilization rates during one year of a teletriage service compared to the previous year without the service.

A free, bilingual telephone triage pilot project called Direct Health/TéléSanté was set up for residents of northern Ontario (Districts of Parry Sound and Nipissing and areas to the north, 2001 census population of approximately 790,000). One of the main goals of teletriage service was to reduce medically unnecessary demand on existing health care resources, such as hospital emergency departments, primary care physicians, and walk-in clinics. Trained registered nurses were accessible by phone 24 hours a day, 7 days a week. Nurses used computer-assisted, medically approved guidelines and their nursing experience to assess patients' symptoms and suggest the most appropriate type of care. Depending on the nature and severity of patients' symptoms, the nurses provided recommendations to conduct informal care (self-care or care for others), visit a family doctor at his or her office or clinic, or visit the nearest emergency department. Nurses also provided basic information about diseases, medications, tests, procedures, and treatments. The Direct Health/TéléSanté service processed over 100,000 calls during its 22 months of operation from June 1999 to March 2001 (Clinidata, 2001a). There were 68,560 calls in the last year of the pilot project, made by approximately 50,000 patients, which represented approximately 6% of the eligible population of northern Ontario.

While there are some data in the literature on how caller and call characteristics vary with location, most of these studies involved different political regions, different call centers, or both (e.g., Munro et al., 2000; Philipp et al., 2000; Salisbury et al., 2000; Shapiro et al., 2004). In contrast, Direct Health/TéléSanté was offered to all residents of northern Ontario through one call center. In addition, all Ontario residents were eligible for medically necessary health services, free of charge. This study was able to avoid some of the confounders present in earlier studies (e.g., systematic differences in health service organization and delivery) and focus on location and population. The objective of this study was to determine if there was any impact of the Direct Health/TéléSanté teletriage service on health service use and whether the impact was greater in the remote areas of northern Ontario.

Methods

The Centre for Rural and Northern Health Research developed a questionnaire to survey consenting patients about their use of and satisfaction with the Direct Health/TéléSanté teletriage service, use of health care services, health status, as well as their socioeconomic and demographic characteristics. The survey methodology and tools were approved by the Research Ethics Board at Laurentian University. Questionnaires

were pilot-tested in January-February 2001. Mailings commenced in late February and ended in mid-June 2001. Surveys were accepted up to the end of August 2001. There were two mailings: one within seven days of the call and the second within 12 days of the call. Effort was made to ensure that there was only one response from any given patient or household. When multiple questionnaires were detected, the questionnaire that was received first was retained to minimize recall bias. It should be noted that callers could phone to discuss their health concern or the concerns of another person (e.g., a mother calling for her child). Results presented here are for the patient, regardless of who made the call. There were 2389 valid and complete questionnaires, yielding a response rate of 44%.

Survey data were used to determine if there was any geographic variation in the impact of the teletriage service on health service use by asking the patients about their intended use of health care service prior to the call (intent), the service advised by the nurse (advice), and the actual health service used by the patient (action). We asked the patients: "What would you have done if you had been unable to contact Direct Health/TéléSanté?" "What was the advice that the nurse ... gave you?" and "...what did you do?" Patients selected one or more items from a list of 15, including "other, please specify." These items were then grouped into four hierarchical categories: (1) visit emergency department, (2) visit physician office or clinic, (3) visit or call other health care provider, and (4) informal care only. "Visit or call other health care provider" was a catch-all category that included calls or visits to pharmacies, calls to EDs, calls to physicians, and calls or visits to alternative or complementary health care practitioners. Informal care included patient self-care and care given to the patient by family or friends. Data in this article may not reflect the path followed by each patient, but do reflect the net impact on health service use as reported by the patient or by the patient's family member or friend.

Geographic categories, derived by Statistics Canada, were based on commuter flow rates to large urban areas (McNiven et al., 2000). The assumption was that commuter flow rates were a proxy for ease of access to health care facilities, particularly to tertiary and quaternary care hospitals. The patient's community name was matched to census subdivision (CSD) to obtain the 2001 metropolitan influenced zone (MIZ) category. The first of five categories consisted of all CSDs within the large urban areas known as census metropolitan areas (population of 100,000 or more) and census agglomerations (population of 10,000 to 99,999) (collectively called CMA/CA). Adjacent CSDs, in which 50% or more of the employed labor force commutes to the nearby CMA/CA, are included in the CMA/CA. Statistics Canada uses commuter flow rates to CMA/CAs to define four additional categories (strong MIZ: 30% or more commuter flow; moderate MIZ: 5% to 29.9%; weak MIZ: 0.1% to 4.9%; or no MIZ: 0%) (McNiven et al., 2000). Based on the number of survey respondents in each geographic category and prior to the examination of the results, the five MIZ categories were condensed into three categories (CMA/CA, strong/moderate MIZ, and weak/no MIZ). MIZ categories, patient's intent, nurse's advice, and patient's action were co-identified for 96% to 97% of the completed surveys such that the minimum number of useable surveys was 1555 for CMA/CA, 204 for strong/moderate MIZ, and 539 for weak/no MIZ.

Survey respondents were a non-random sample, given that respondents could choose to give consent to participate and could choose to return the completed questionnaire. We used contingency tables and chi-squared tests, to determine if the survey respondents were representative of the general population of northern Ontario or representative of all patients of the teletriage service. Socioeconomic and demographic characteristics as well as characteristics of the call and health service use were examined. Analyses were conducted with the Statistical Package for the Social Sciences (SPSS) version 12.

Results

The patients of the teletriage service who responded to the survey were more likely to be female (63%) than the general population of northern Ontario (50%) ($\chi^2 = 120.6$, $df = 1$, $p < 0.001$) (Hogenbirk and Pong, 2004). Patient respondents were also younger than the general population ($\chi^2 = 44.1$, $df = 3$, $p < 0.001$), with proportionally more who were 0 to 16 years old. Compared to all of the patients who called the teletriage service in the six months after the pilot project (Clinidata, 2001b), survey respondents matched exactly on the percent who were female, but still tended to be younger than all patients ($\chi^2 = 132.5$, $df = 1$, $p < 0.001$).

Survey respondents differed from all patients with respect to call characteristics. For instance, more survey respondents called on behalf of another person (56%) relative to all patients (50%) in the six months after the pilot project ($\chi^2 = 35.4$, $df = 1$, $p < 0.001$). In addition, more survey respondents called to discuss symptoms (92%) rather than for information only, relative to all patients (83%) in the six months after the pilot project (April to September 2001) ($\chi^2 = 121.2$, $df = 1$, $p < 0.001$).

Survey respondents also differed from all patients with respect to health service use (intended and recommended use). Survey respondents had originally intended to visit the ED (43%) or the physician (24%) prior to their call more frequently than all patients (17% ED visits, 5% physician visits) for three months during the pilot project (September to November 2000) or in the six months after the pilot project ($\chi^2 > 2600$, $df = 3$, $p < 0.001$). Survey respondents reported that they had originally intended fewer calls or visits to other health care providers or for informal care, relative to all patients.

There were also statistically significant differences between respondents and all patients in the health service use advised by the nurse. Proportionally more respondents were advised to visit the ED (36%) and proportionally fewer were advised to visit the physician (25%) relative to all patients (25% ED visits, 34% physician visits) during the pilot project (all 22 months) or in the six months after the pilot project ($\chi^2 = >619$, $df = 3$, $p < 0.001$). Survey respondents reported that they had been advised more often to call or visit other health care providers and less often to perform informal care, relative to all patients. Subsequent statistical analyses of geographic differences in health service use were not conducted because survey respondents were not randomly selected and were not representative of all patients of the teletriage service.

There is some evidence that patient's intended use of health care services (patient's intent), service recommended by the nurse (nurse's advice), and actual health service used (patient's action) varied with the type of health care and with patient location. For visits to the emergency department (ED), a higher percent of patients living in weak/no MIZ (54%) had intended to visit the ED compared to patients living in strong/moderate MIZ (47%) or in CMA/CAs (39%) (fig. 1). The percent of patients who were advised to visit the ED by teletriage nurses was lower by 5 to 14 percentage points in all geographic categories. Patient's actual use of health service (patient's action) was within one percentage point of the nurse's advice. Survey data suggest that proportionally fewer patients in the urban areas (CMA/CA) had intended to, were advised to, or did visit the ED relative to patients in rural or remote areas. The percentage of patients living in weak/no MIZ who had intended to visit the ED was higher than that of the percentage of patients living in strong/moderate MIZ, but this difference between the two geographic categories disappeared for the percent of patients who were advised to or who actually did visit the ED. The statistical significance of these trends is unknown.

There was some evidence for differences among geographic categories for visits to the physician's office or clinic. Approximately 16% of patients living in weak/no MIZ or strong/moderate MIZ reported that they had this intention prior to making the call,

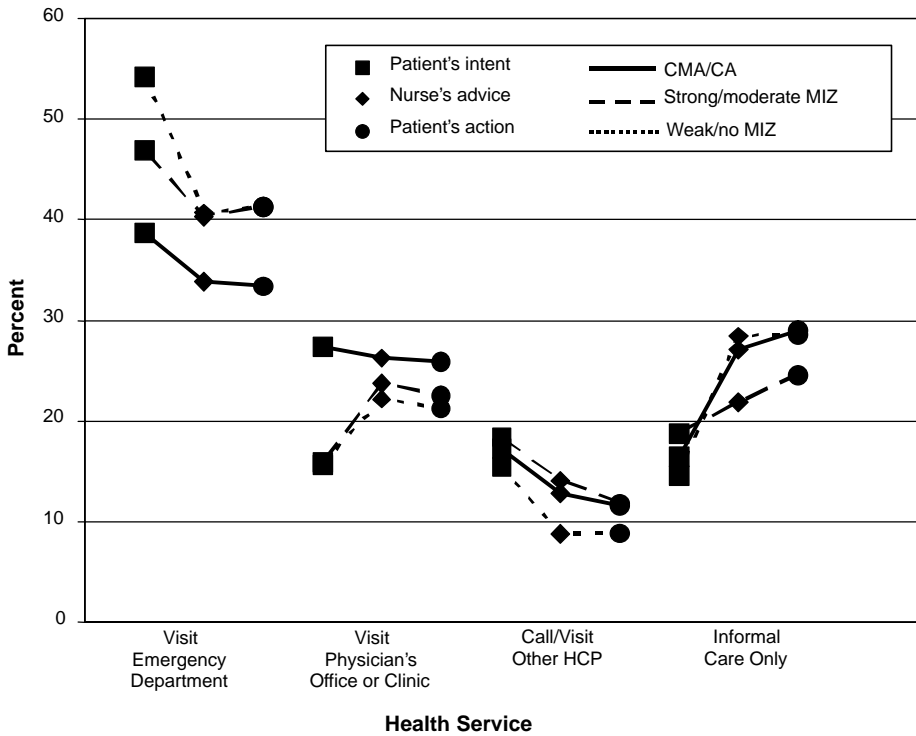


Figure 1. Percent of patients for each time period by service type and geographic category. Time periods are: patient's intended use of health care services (patient's intent), service advised by the nurse (nurse's advice), and actual health service used (patient's action). "Call/visit other HCP" includes calls or visits to pharmacies or complementary health care providers (HCP) and calls to physicians or emergency departments. Geographic categories start with highly urban areas [census metropolitan area/census agglomeration (CMA/CA)] and use commuter flows into CMA/CAs to classify adjacent areas into strong/moderate or weak/no metropolitan influence zones (MIZ). Patient percentages sum to 100% for each time period for each geographic category across the four service types (e.g., 54 + 16 + 15 + 16 = 100% for patient's intent in weak/no MIZ).

whereas 27% of patients living in CMA/CAs reported this intention. The percent of patients who were advised by nurses to visit the physician was 7 to 8 percentage points higher than for patients in weak/no MIZ or strong/moderate MIZ and 1 percentage point lower for patients living in CMA/CAs, relative to patients' intent. Once again, the percent of patients who actually visited the physician was within one percentage point of those advised to do so by the nurse. Differences among the geographic categories were large for patient's intent, but only 4 to 5 percentage points for those who were advised to and those who actually visited the physician's office or clinic.

There was little evidence for any difference among geographic categories for either calls or visits to other health care providers or for informal/self-care. Survey responses suggest that the nurse's advice decreased the number of calls or visits to other health care providers by 4 to 6 percentage points and increased the instances of informal/self-care by 3 to 14 percentage points, more-or-less independent of the patient's location.

Approximately 63% of the respondents were female, and there were no large differences among geographic categories. Examination of six age categories (16 years or younger, 17 to 34, 35 to 49, 50 to 64, 65 to 74, and 75 years or older) revealed some

differences among geographic categories. There were more young patients (0 to 16 years) in weak/no MIZ and, conversely, fewer in strong/moderate MIZ categories.

Self-reported health status was not substantially different among geographic categories. Converting the frequency distribution to a score (excellent = 5) yielded a mean of 3.9 in both CMA/CA and strong/moderate MIZ, and 4.1 in weak/no MIZ. There were no substantial differences among geographic categories for whether the call was made to discuss symptoms or to request information. Reasons for the call were quite diverse (e.g., patients asked about cold and flu symptoms, pain, abnormal discharges or color or swelling, injury and post-surgical treatment, pre- and post-natal care, bites, cuts, allergies, side-effects and proper use of off-the-shelf or prescribed medications, reproductive health, etc.), and there were no major differences among locations. Nor were there major differences among geographic categories for patient's satisfaction with the service: over 94% ranked the service as "very good" or "excellent" for quality of service or for advice.

Discussion

Nurse teletriage may have decreased visits to the emergency departments, relative to patient intent, and this effect appears to be stronger in rural or remote areas (weak/no MIZ, strong/moderate MIZ) than in urban areas (CMA/CA) of northern Ontario. The overall trend for decreased ED visits was consistent with findings from a RCT conducted by O'Connell and colleagues (2001), but differed from another RCT (Darnell et al., 1985) that found no significant difference. A recent systematic review (Stacey et al., 2003) concluded that the evidence for impact on ED visits was inconsistent.

The survey also suggested that the teletriage service may have increased visits to physicians' offices or clinics, relative to patient intent, but only for patients living outside of urban areas. In contrast, a systematic review concluded that teletriage had decreased the number of visits to health practitioners (Stacey et al., 2003).

There is some evidence that the percent of patients who made calls or visits to other health care providers (HCP), such as pharmacists, may have decreased and the percent of patients who performed informal care or self-care may have increased relative to the patient's original intention. This potential effect of the teletriage service on calls or visits to other HCP and informal/self-care did not vary appreciably with geographic location.

There is some evidence from the U.K. that urban populations have higher call rates (129 per 1000) than urban-rural mixed populations (28 to 68 per 1000) (Munro et al., 2000) and that underprivileged areas have higher call rates (239 per 1000) than other areas (141 per 1000) (Salisbury et al., 2000). There is also evidence that reasons for calls and the recommendations of the nurse differed between urban and suburban populations in Massachusetts (Philipp et al., 2000) and nurses' advice differed among large regions in the U.S. (Shapiro et al., 2004). However, it is not clear from these studies whether the variation is due to differences in population characteristics (demographics, insurance status, health status, etc.), in health service organization or delivery (including the teletriage service), in geographic location, or in the interactions.

The teletriage service was likely one of several factors that influenced the northern Ontario patient's use of medical services. Other factors include availability, access, cost, and time. For example, the higher percent of patients living in remote areas who intended and then went to the ED and the lower percent who intended and then visited the physician's office or clinic may reflect the perceived or actual availability of medical services in these regions. The literature suggests that residents of northern Ontario have insufficient primary care relative to all Ontario residents (Shah et al., 2003), and that

residents of the Canadian north have significantly lower self-reported health status and significantly higher self-reported un-met health needs relative to all Canadians (Mitura and Bollman, 2003). These differences in intent and action may also reflect differences in the perceived and actual urgency of the health condition that prompted the call.

We were unable to rule out possible differences in perceived or actual urgency, but we were able to examine some possible confounders. There were no substantial differences among geographic location for: gender, self-reported health status, satisfaction with the service, or for whether the call was made to discuss symptoms or to obtain information only. However, additive or synergistic effects of these possible confounders could not be dismissed.

The one geographic difference in demographic characteristics that did exist in the survey was that there were more young patients (0 to 16 years) in the remote geographic locations (weak/no MIZ). Pediatric concerns may have a higher perceived urgency in the mind of the caller, and this may explain the higher percent of patients in the remote areas who had intended to visit the ED. The greater percentage of younger patients in the survey, relative to all patients of the teletriage service, may also explain why more survey respondents had originally intended to visit the ED or the physician prior to the call, relative to all the patients of the teletriage service.

Overall, there was a decreasing trend for visits to the ED and a slight increasing trend for informal care. This raises the question as to whether medically necessary visits were being deferred to the detriment of the patient's health. Results from an audit of a convenience sample of 73 calls to the Direct Health/TéléSanté teletriage service, conducted by two family physicians, two nurse practitioners, and two registered nurses with teletriage experience, found that the advice was appropriate in 83% of audits and slightly overly cautious or slightly insufficient (but with good reason) in another 8% of the audits (Hogenbirk and Pong, 2004). The teletriage service provider did not report any complaint related to medically insufficient advice (Clinidata, 2001a). Results of a RCT in California found that approximately 4% of all callers received medically significant treatment after the call, even though they had been advised otherwise (Lee et al., 2003). Overall, the evidence suggests that only a few medically necessary visits may have been deferred after the patient made the call to the teletriage service.

The survey results are not without limitations and should be interpreted with caution. Recall bias was minimized by sending the questionnaire within 7 to 12 days of the call. In addition, there may be differences between what the patient understood and what the nurse recommended. The literature suggests that patients' recollection may differ from provider records in up to 27% of the calls (e.g., Leclerc et al., 2003). Survey respondents constituted a non-random sample and were not representative of all patients who used the teletriage service due to selection bias that occurred at two stages: granting consent at the time of the call, and submitting a completed questionnaire. Additionally, respondents were younger and more are female, relative to the general population of northern Ontario. We estimate that the survey represents about 10% of the total patient population that called during the survey time period. Evidence from unpublished studies by the authors (Hogenbirk et al., 2002) suggests that survey respondents may be those consenting patients who were the most compliant with the nurse's advice. Thus, the survey results may be prone to selection, social desirability, and recall bias. The effects of these biases are unknown.

Conclusion

Survey results suggest that a higher percent of patients who lived in rural and remote areas had intended, were advised, and did go to visit the ED compared with patients who live in urban areas. The opposite was found for visits to physician offices or clinics, i.e., the percent for patient's intent, nurse's advice, and patient's action were lower for patients living outside the urban areas. Percent for informal care or for other types of health care use (a catch-all category that included calls to EDs or physicians and calls or visits to pharmacies or other health care providers) did not vary greatly with patient location.

The teletriage nurses may be directing patients away from visits to the ED and toward visits to physician offices or clinics or toward performing informal care, and the difference may be greatest for remote regions in northern Ontario. An unpublished examination of Ontario Health Insurance Plan claims suggests that this effect may not yet be apparent at the community level, given that only 6% of the eligible population accessed the teletriage service during the pilot project phase. The effect may also depend on the patient's health concern at the time of the call, as some intended visits may be discouraged (e.g., common cold with no complications) or encouraged (e.g., chest pains).

The implications of these findings are not yet clear. The results were consistent with the stereotype of remote residents who only seek medical services when their condition becomes urgent and who know that the only available physician is on-call at the ED. Controlled studies that examine the patient's intent, the nurse's advice, and the patient's action, while recording the reason for the call, the time and date of the call, and the spatial and temporal availability of medical services, may help to clarify the implications of teletriage for medical service use in rural and remote areas.

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